Epidemiologic Study of 112 Osteosarcomas in Chiang Mai University Hospital, Thailand

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Objective: *To summarize the epidemiologic features of osteosarcoma.*
Material and Method: *One hundred and twelve cases of osteosarcoma were collected retrospectively from the Pathology Department of the Chiang Mai University Hospital, Thailand between 1995 and 2005.*
Results: *From the present study, there were 14 cases in average, annually, since 2002. Seventy-seven percent of cases were from the upper north Thailand, the region serviced by Chiang Mai University Hospital. The male:female ratio was 1.3:1 and 86% of cases occurred within the first three decades of life. The majority of cancer was found in the long bones (83%) and the majority of lesion was around the knee (68%). Conventional and telangiectatic osteosarcoma accounted for 85% and 8% of cases, respectively.*
Conclusion: *The authors have summarized some epidemiologic features of osteosarcoma. The authors found the relatively high frequency of telangiectatic osteosarcoma around the upper part of north Thailand. These results give an initial picture to the national health provider section for planning personnel, medical and supportive equipment, and funding for the care of osteosarcoma patients. Nationwide co-operation in registering osteosarcoma patients would provide more complete data on this tumor in Thailand and promote the establishment of standardized treatment protocols.*

Keywords: *Osteosarcoma, Epidemiology, Distribution*

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Osteosarcoma is a mesenchymally derived malignant tumor that by definition produces osteoid and/or bone[1]. It is the most common, non-hematopoietic, primary malignant tumor of bone[1-5] with the age-specific incidence rate of 7.1 per million in Thai children aged between 10 and 14 years[6]. This cancer accounts for 36% of major limb amputations in our institute[7]. The authors have recently found a relatively high frequency of osteosarcoma (67%) among malignant non hematologic bone tumors in Chiang Mai University Hospital between 2000 and 2004, compared to other series[4]. This result prompted the authors to examine the epidemiologic features of osteosarcoma experienced at Chiang Mai University Hospital, Thailand. The present paper summarizes the findings over an 11-year period.

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Material and Method

In this retrospective study, the clinical and pathological data of all osteosarcoma cases diagnosed at the Pathology Department of Chiang Mai University Hospital between 1995 and 2005 were reviewed. The variables of interest included home province of the patients, year and age of diagnosis, gender, the first symptom and duration of symptom, site of affected bone, and histology subtype according to the recent WHO classification of bone tumors[8]. The data were summarized using Intercooled Stata 8.0. The present project was approved by the Research Ethics Committee, Faculty of Medicine, Chiang Mai University.

The variables were presented with number and percentage in the frequency tables, bar diagrams, and line distribution. Mean and standard deviation or median were summarized in the result.

Results

There were 112 osteosarcoma cases. Except for two Laotian patients, all were from northern Thailand, the region serviced by Chiang Mai University Hospital. The distribution of home provinces of the patients is presented in Table 1. Almost half of the patients (49.1%) were from three provinces including Chiang Mai (n = 30, 26.8%), Lampang (n = 13, 11.6%), and Chiang Rai (n = 12, 10.7%). The annual incidence of osteosarcoma is shown in Table 2.

There were 64 (57.1%) male and 48 (42.9%) female patients (male:female ratio = 1.3:1). The ages ranged from 7 to 61 years with a median age of 18 years and a mean of 20.7 $\pm$ 11.9. The age distribution is presented in Fig. 1. Ninety-six cases (85.7%) occurred within the first three decades of life. The presenting clinical features were mass (n = 59, 54.6%), pain (n = 45, 41.7%), and pathologic fracture (n = 4, 3.7%). The duration of symptoms varied from less than 1 week to 52 weeks with a median of 8 weeks and a mean of 13.3 $\pm$ 13.2).

The tumors occurred in long bones (n = 93, 83.0%) more than in flat bones (n = 19, 17.0%). Of the 93 long bone cases, 91 (97.9%) were situated in the metaphysis and 2 (2.15%) in the diaphysis. The bone distribution of osteosarcoma is presented in Fig. 2. The femur (n = 49, 43.8%), tibia (n = 31, 27.7%), and ilium (n = 10, 8.9%) were most commonly affected. Seventy-six cases (67.9%) fell into the category of 'around the knee' lesions.

Conventional osteosarcoma (Fig. 3) accounted for 84.8% of cases (n = 95) (Table 3). There were nine cases (8.0%) of telangiectatic osteosarcoma, three cases (2.7%) of giant cell tumor-rich osteosarcoma, and one case (0.9%), each, of other subtypes.

Discussion

In the present study, the annual incidence of osteosarcoma was constantly above 10 cases (11-17 cases, average 13.75 cases) since 2002. This number is comparable to an annual incidence of osteosarcoma in Ramathibodi Hospital (RAMA), Bangkok, Thailand (average 13 cases)[9]. The majority of cases (n = 86, 76.8%) reside in the most northern part of Thailand, i.e., Chiang Mai, Lampang, Chiang Rai, Lamphun, Phayao, Nan, Phrae, and Mae Hong Son, the region

Table 1. Home province of osteosarcoma cases

Province	n (%)
Chiang Mai	30 (26.79)
Lampang	13 (11.61)
Chiang Rai	12 (10.71)
Lamphun	9 (8.04)
Phayao	8 (7.14)
Nan	8 (7.14)
Sukhothai	6 (5.36)
Tak	6 (5.36)
Uttaradit	5 (4.46)
Phrae	4 (3.57)
Phitsanulok	4 (3.57)
Mae Hong Son	2 (1.79)
Phetcahbun	2 (1.79)
Laos	2 (1.79)
Nakhon Sawan	1 (0.89)
Total	112 (100)

Table 2. Annual incidence of osteosarcoma

Year	n (%)
1995	5 (4.46)
1996	6 (5.36)
1997	16 (14.29)
1998	7 (6.25)
1999	7 (6.25)
2000	9 (8.04)
2001	7 (6.25)
2002	17 (15.18)
2003	11 (9.82)
2004	14 (12.50)
2005	13 (11.61)
Total	112 (100)

Table 3. Subtype of osteosarcoma

Subtype	n (%)
Conventional	95 (84.82)
Telangiectatic	9 (8.04)
Small cell	1 (0.89)
Periosteal	1 (0.89)
Parosteal	1 (0.89)
Low grade central	1 (0.89)
Intracortical	1 (0.89)
Giant cell rich	3 (2.68)
Total	112 (100)

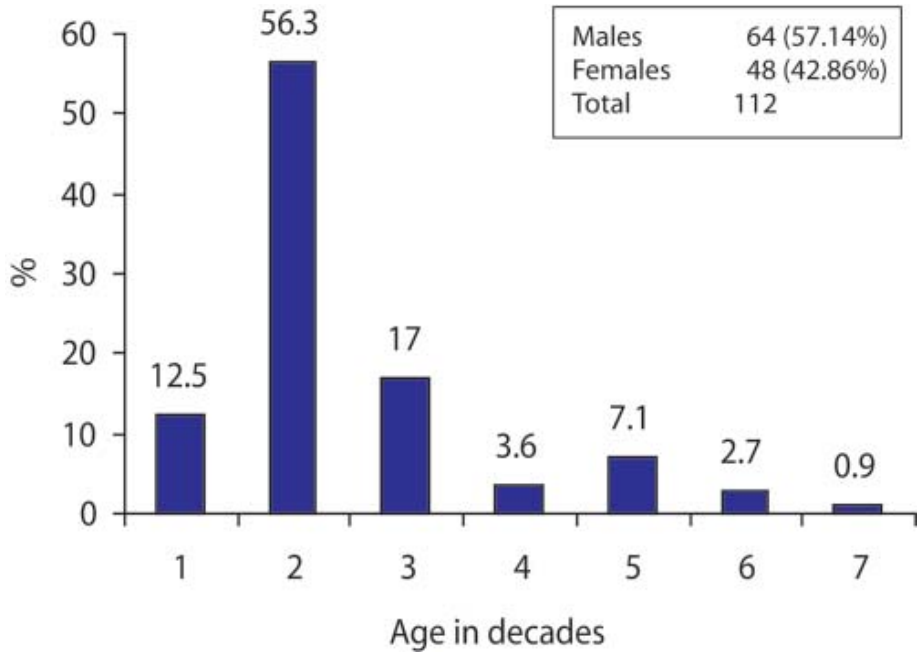

Fig. 1 Distribution of osteosarcomas by age of the patient (first decade, n = 14; second decade, n = 63; third decade, n = 19; fourth decade, n = 4; fifth decade, n = 8; sixth decade, n = 3; seventh decade, n = 1)

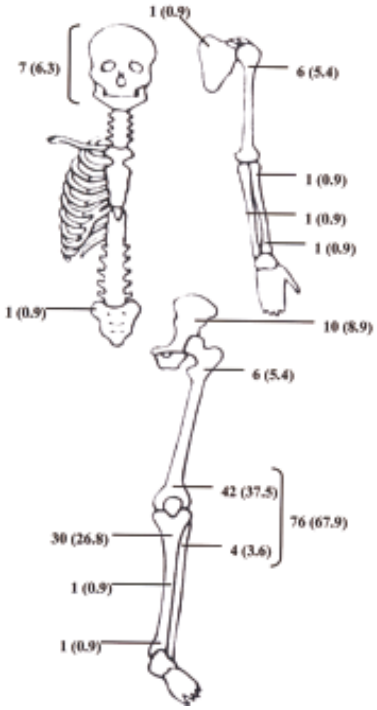

Fig. 2 Distribution of osteosarcomas by site of the lesion; number (%)

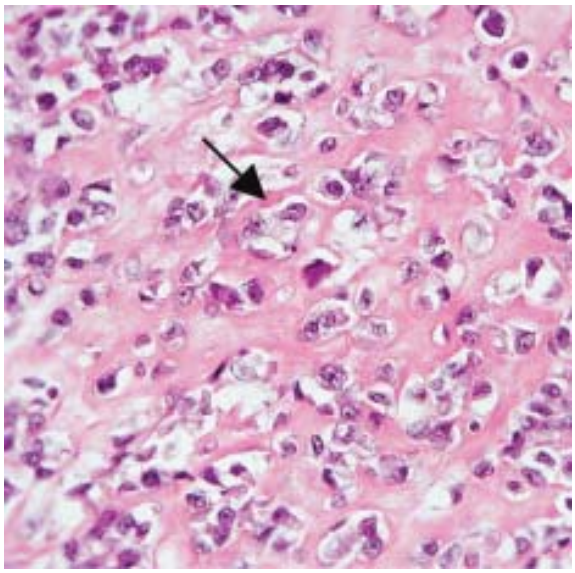

Fig. 3 The section of conventional osteosarcoma showed malignant cells that produce osteoid (arrow) (H&E, x400)

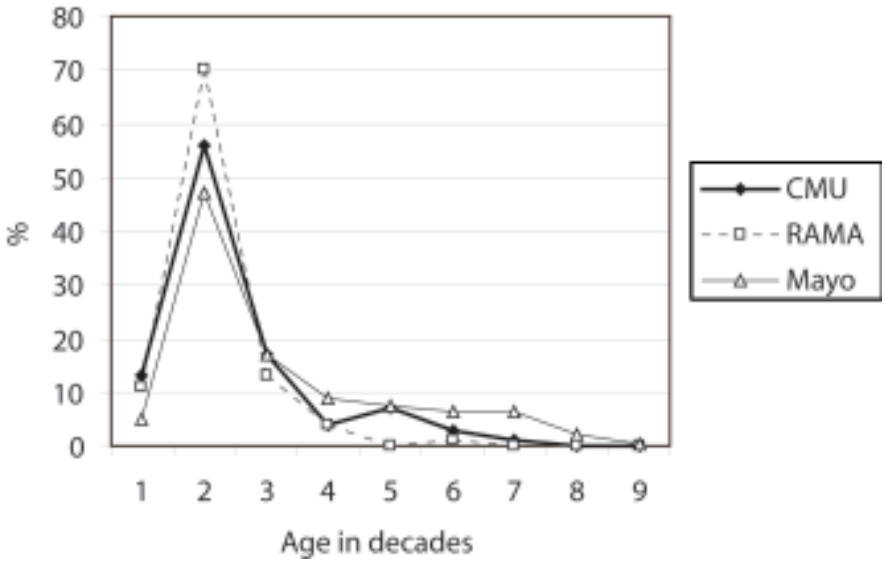

Fig. 4 Age distribution of patients with osteosarcoma from Chiang Mai University Hospital (CMU), Ramathibodi Hospital (RAMA)[10], and Mayo clinic[5]

that is serviced by Chiang Mai University Hospital. The more southern part of this region is closer to Bangkok and patients from this area would be registered in that city.

The features found for Chiang Mai University Hospital with respect to age distribution, male: female ratio, proportion of long bone involvement, and proportion of 'around the knee' lesion are comparable to series from Ramathibodi Hospital[9-11] and the Mayo clinic[5] (Fig. 4 and Table 4). The peak incidence is uniformly in the second decade and a second peak is observed in the fifth and sixth decades.

The frequency of telangiectatic osteosarcoma, in the present study is relatively high[12] (8.0%), compared to those of 3.5% in the Mayo clinic[5]. Giant cell rich osteosarcoma (Fig. 5) is viewed as a subtype of conventional osteosarcoma because it is not associated with a specific biological behavior[3]. Nevertheless, the microscopic features of giant cell-rich osteosarcoma could be confused with giant cell tumor of bone, and correlation of biopsy results with the clinical and radiological features is essential.

Table 4. Comparison of the features of osteosarcoma

	CMU	RAMA	Mayo
Number of case	112	130	1649
M:F ratio	1.3:1	1.2:1	1.4:1
Long bone	83.0%	96.9%	73.4%
Around the knee lesion	67.9%	84.6%	48.2%

CMU, Chiang Mai University; RAMA, Ramathibodi Hospital[9-11]; Mayo, Mayo clinic[5]

The authors have summarized epidemiologic features of osteosarcoma highlighting the annual incidence and home province distribution of the patients from the region serviced by the referral centre. The incidence, age, gender, and bone distributions of ostosarcoma in Chiang Mai University Hospital are in keeping with the data from the other series. In other words, the authors found no indication that osteosarcoma is different from this region of the world compared to elsewhere. These results provide an initial picture to the national health provider section for planning in terms of personnel, equipment and budget needed for the care of patients with osteosarcoma. A national effort for registration of such patients would improve data collection and promote the use of standardized treatment protocols for better evaluation of effectiveness of therapy and patient outcome.

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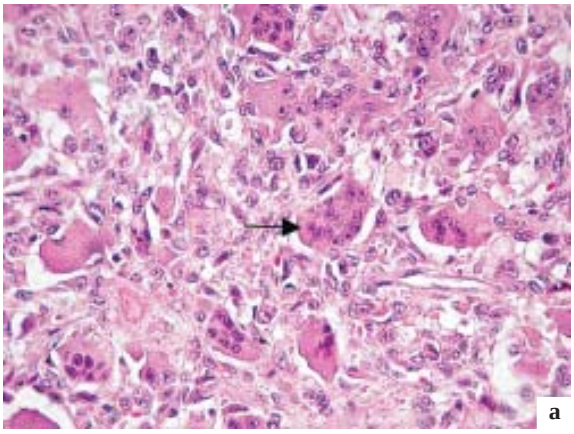

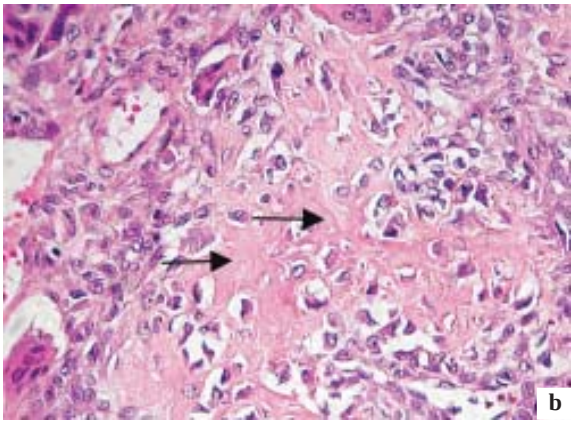

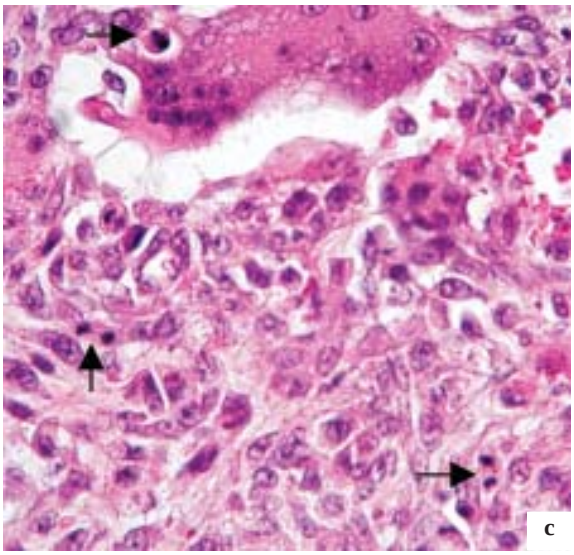

Fig. 5 The sections of giant cell rich osteosarcoma revealed (a, H&E, x200) several multinucleated giant cells (arrow); (b, H&E, x200) lace-like osteoid (arrow) producing malignant cells; and (c, H&E, x400) many mitoses (arrow)

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การศึกษาทางด้านระบาดวิทยาของมะเร็งกระดูกชนิด osteosarcoma ในผู้ป่วย 112 ราย จากคณะแพทยศาสตร์เชียงใหม่

จงกลณี เศรษฐกร, สำเริง รางแดง, โอฬาร อาภรณ์ชยานนท์, สุรีย์ เลขวรรณวิจิตร, พัชรีย์ สุวรรณสนธิ์, พอล เอส ธอร์นเนอร์

จุดประสงค์ของการศึกษานี้คือ เพื่อสรุปลักษณะทางด้านระบาดวิทยาของมะเร็งกระดูกชนิด osteosarcoma ที่มารับการรักษา ณ คณะแพทยศาสตร์ มหาวิทยาลัยเชียงใหม่ พบว่าจากบันทึกของภาควิชาพยาธิวิทยาในระหว่างปี พ.ศ. 2538 ถึงปี พ.ศ. 2548 มีผู้ป่วยที่ได้รับการวินิจฉัยว่าเป็น osteosarcoma ทั้งหมด 112 ราย ในช่วงปี พ.ศ. 2545 ถึงปี พ.ศ. 2548 มีจำนวนผู้ป่วยเฉลี่ยปีละ 14 คน ร้อยละ 70 ของผู้ป่วยมีภูมิลำเนาอยู่ในเขตภาคเหนือตอนบน อัตราส่วนเพศชาย ต่อ เพศหญิง เท่ากับ 1.3 ต่อ 1 ร้อยละ 86 ของผู้ป่วยมีอายุน้อยกว่าหรือเท่ากับ 30 ปี ส่วนใหญ่ (83%) ของมะเร็งเกิดขึ้นที่กระดูกชิ้นยาว และ ร้อยละ 68 เป็นมะเร็งที่พบรอบข้อเข่า พบมะเร็งกลุ่ม conventional มากที่สุด (85%) รองลงมาเป็นมะเร็งกลุ่ม telangiectatic osteosarcoma (8%) ความรู้เกี่ยวกับอุบัติการณ์ของโรค และภูมิลำเนาของผู้ป่วยจากการศึกษานี้ และการพบมะเร็งกลุ่ม telangiectatic osteosarcoma จำนวนค่อนข้างมากนี้ สามารถนำไปใช้เป็นพื้นฐานสำหรับหน่วยงานสาธารณสุข ในการวางแผนทางด้านบุคลากร เครื่องมือทางการแพทย์ และงบประมาณเพื่อการรักษาผู้ป่วย osteosarcoma ความร่วมมือในระดับประเทศในการลงทะเบียนผู้ป่วยและติดตามผลการรักษา จะนำไปสู่การพัฒนาแบบแผนของการรักษาที่ได้มาตรฐานต่อไปในอนาคต